
Tunable shrink-induced honeycomb microwell arrays for uniform embryoid bodies.

Journal: Lab Chip

Publication Year: 2009

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PubMed link: 19904398

Funding Grants: Micro Platform for Controlled Cardiac Myocyte Differentiation

Public Summary:

Scientific Abstract:

Embryoid body (EB) formation closely recapitulates early embryonic development with respect to lineage commitment. Because it is greatly affected by cell-cell and cell-substrate interactions, the ability to control the initial number of cells in the aggregates and to provide an appropriate substrate are crucial parameters for uniform EB formation. Here we report of an ultra-rapid fabrication and culture method utilizing a laser-jet printer to generate closely arrayed honeycomb microwells of tunable sizes for the induction of uniform EBs from single cell suspension. By printing various microwell patterns onto pre-stressed polystyrene sheets, and through heat induced shrinking, high aspect micromolds are generated. Notably, we achieve rounded bottom polydimethylsiloxane (PDMS) wells not easily achievable with standard microfabrication methods, but critical to achieve spherical EBs. Furthermore, by simply controlling the size of the microwells and the concentration of the cell suspension we can control the initial size of the cell aggregate, thus influencing lineage commitment. In addition, these microwells are easily adaptable and scalable to most standard well plates and easily integrated into commercial liquid handling systems to provide an inexpensive and easy high throughput compound screening platform.

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